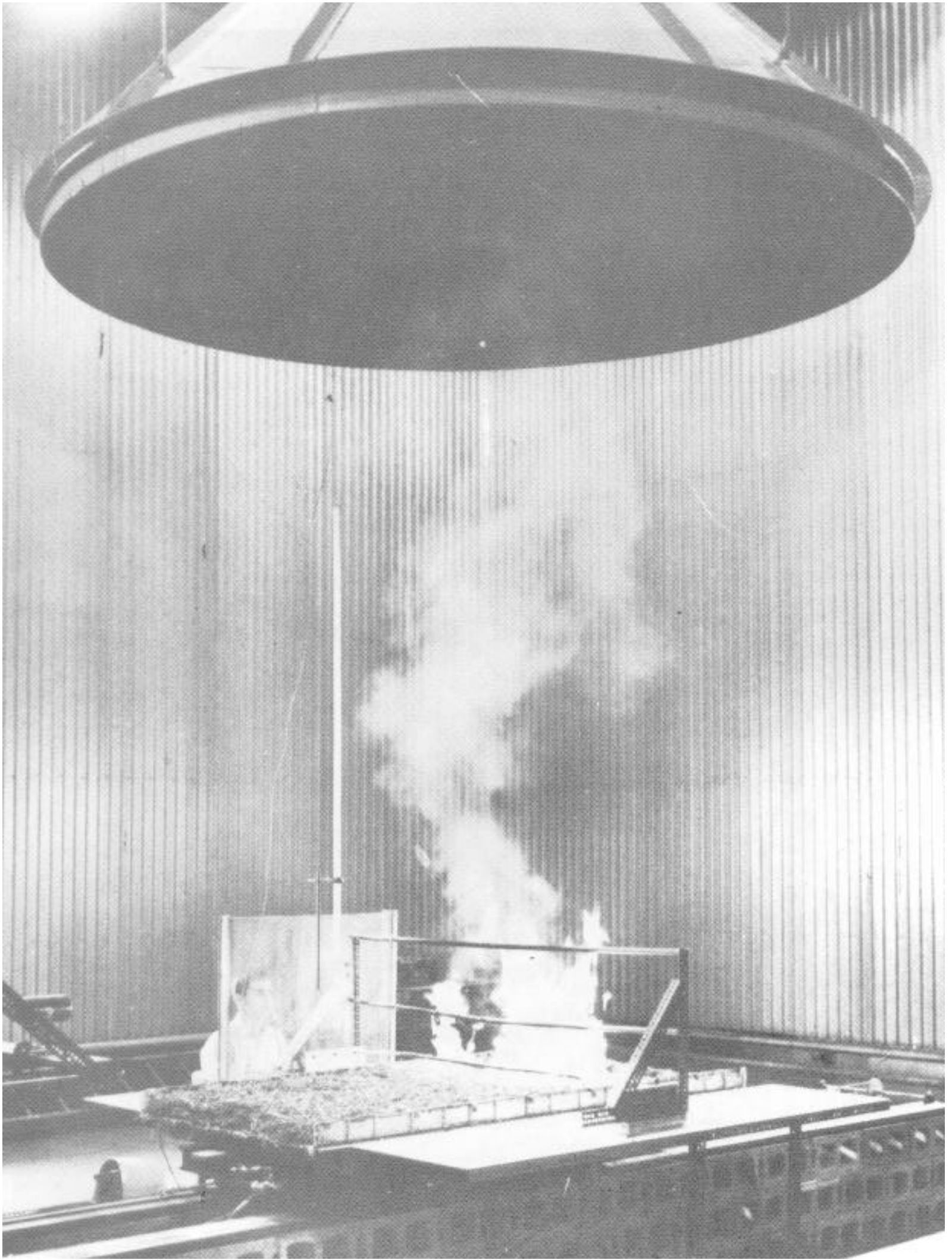


18

RESEARCH FOR TOMORROW'S FIRE PROBLEM

In both the public and private sectors, the Nation spends about $105 million annually on research and development related to fire (see Appendix VII). It would be difficult to define an adequate level of investment against which this figure could be compared. But evidence marshaled earlier in this report of laggard progress in the technology of firefighting, the treatment of burn and smoke victims, and fire protection of the built environment suggests that the Nation is seriously under-investing in fire-related research.

Much of the research is devoted to narrow- and short-term goals. Industrial research and development, for example, is largely devoted to ensuring that materials and products meet existing codes rather than more ambitious standards of fire safety. Of the $27 million spent on fire research and development by the Federal Government, about $18 million is directed to the specific missions of the sponsoring agencies-for example, in the Atomic Energy Commission, to the prevention and control of fires in nuclear reactor facilities.

Comparatively little has been done in the realm of basic research and other research in which, if a technological improvement is a possibility, it is a long-term payoff. As far back as 1959, the Committee on Fire Research of the National Research Council noted a dearth of basic research directed toward a fundamental understanding of the phenomena of ignition, fire growth, and fire spread. The Committee recommended a "national program emphasizing those areas not adequately covered by current efforts of military and civil agencies." During the 1960's, most of the basic research on fire pertained to forest fires, since the forest environment was easier to deal with and properly preceded attention to the more complex environment of urban fires. By 1969, the Committee on Fire Research was able to report "small but significant" progress in basic fire research.

In the mid-1960's, research interest in the built environment was spurred by new Federal laws dealing with fire safety, in particular with certain fabrics and the materials in aircraft interiors. An expanding role for the Federal Government was defined when the Fire Research and Safety Act of 1968 authorized the National Bureau of Standards to undertake a more comprehensive research program. When the National Science Foundation established its Research Applied to National Needs program in 1971, it opened the way to more extensive fire research.

495-792 O - 73 - 10

Some notable achievements have been made. For example, some of the reactions that take place in a flame are now understood, which opens the way to understanding how the addition of chemicals might inhibit flames. The basic mechanisms of heat radiation are understood almost to the point where the distances at which other fuels in a room will ignite by the radiative energy from a fire can be predicted. In the realm of technological improvements, additives for water have been developed which reduce friction in a hose. Other additives make water "light" so that it floats on top of liquid fuels and smothers flames.

Some Areas for Exploration

There is much to be done in the broad field of fire research. We have indicated important areas for specific research throughout the report.

One basic need is to strengthen this grounding of knowledge about fire in a body of scientific and engineering theory, so that real-world problems can be dealt with through predictive analyses. The development and testing of new materials and assemblies, the teaching of fire protection, the creation of new architectural designs, the engineering design of more effective fire control systems, and the development of fire prevention programs could be greatly expanded and improved if more fundamental understanding of fire behavior were available.

Human Behavior. Because so many fires are due to human carelessness, and because so many people react counterproductively when a fire occurs, the Commission has placed great emphasis on education as a means of reducing the Nation's fire losses. But "carelessness" blankets a range of behavior from relative innocence and helplessness to subconscious attention-getting or self-destructiveness. Effective educational efforts will depend on a much firmer knowledge of why people cause fires than now exists. Moreover, those efforts will require studies of what kinds of fire safety messages work--that is, which kinds of presentations alter human behavior to reduce fire accidents and their consequences-rather than cause citizens to "tune out" (as can happen if the messages are too scary), or blunt their sensitivity through too much repetition.

Likewise, "arson" covers behavior from pyromania to fire-setting motivated by greed. Better understanding of this range of behavior would greatly aid the apprehension of arsonists, the search for safeguards against arson, and the search for alternatives-that is, less destructive outlets for the mentally sick arsonist, and attractive economic alternatives for those who deliberately set fire to their own property.

Fire dynamics. To the extent that materials in the built environment are controlled at all, they are controlled by voluntary standards and building codes, each of which can be no better than the test methods specified for measuring fire performance. Unfortunately, present test methods often yield numbers that tell little more than how materials or structures behave in idealized test configurations. Actual fire performance in a building depends critically on such factors as physical layout, interactions between walls, floors, and ceilings, fuel loads, and the presence of complicating components such as air conditioning ducts. Thus there is a need for research toward the development of test methods that more accurately predict real-world fire performance.

Smoke and *toxic* gases. The physiological effects of smoke inhalation and tolerance limits are not known adequately. Neither is much known about the chemical nature of combustion products, nor how smoke and gases are influenced by combustion conditions, such as temperature and turbulence. Smoke and toxic gases are important hazards, and a better understanding **of** their chemical and physical nature, how they are generated, how they move with lethal effect for great distances through a building, and their physiological effects would provide a foundation of knowledge needed for the development of test methods, standards, and countermeasures.

Automatic detection. Of basic importance is finding the best harbinger of fire. Three considerations enter in: reliable early warning, low cost, and a triggering mechanism that will not be activated by causes other than fire. The best early-warning detectors now on the market use optical detectors to sense smoke or electrical means to detect the particulate products of combustion. Largely as a result of contracts from the National Aeronautics and Space Administration, a number of industrial and Government laboratories are investigating carbon monoxide detection by spectroscopic techniques. Another possible ap-

proach is detection of microscopic particulates, called aerosols, which are known to be produced in copious quantities by combustion, but which themselves are little understood.

Additional basic knowledge is needed on how fast detectors must react, what they must be sensitive to, and how they should be placed to be maximally effective.

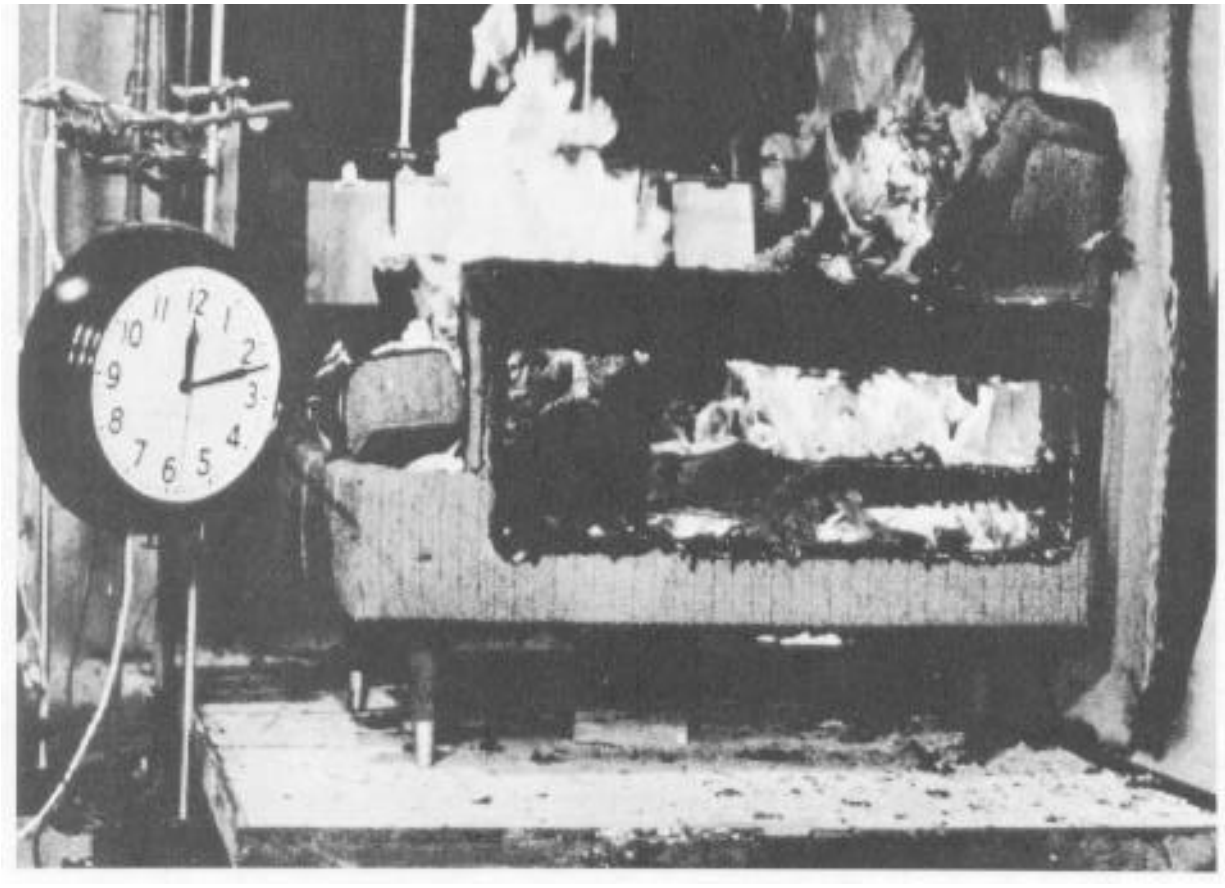
Fire services. As we discussed in detail in Chapter 7, there is room for improvement in the technology of every aspect of firefighting: in the means by which fire departments are notified of fires, in the ways in which men and equipment are dispatched, in firefighters' personal equipment, in the trucks and hoses and suppression agents used to put out fires.

State and local pilot programs. To ensure the prompt introduction of research results, a major effort in translating research into operational practice is essential. We envision pilot programs at the State and local level providing the opportunity for field testing of new research ideas in the real world, serving as a mechanism for demonstrating the practicality of technological innovations to the fire services, and providing training to assist the fire services in their use.

Goals for Research

Most discussions about fire research focus ***on*** particular research problems, rather than on larger questions of what the research can accomplish. Yet for new initiatives in fire research to be justified, the *potentials* of fire research ought to be clearly stated.

One need only consider the chief causes of fire losses-carelessness and shortcomings of design-to realize that losses could be significantly reduced through research. The National Bureau of Standards has suggested that a 50 percent reduction in all categories of losses is possible. A more detailed and ambitious set of goals for research would include the following:



When their products can cause fire to spread rapidly, manufacturers should conduct research to make them safer.

- Reduce fires clue to human behavior by 80 percent;
- Increase in-hospital survival of burn patients by 50 percent through improved burn care;
- Decrease firefighter injuries by 50 percent through better personal protective equipment;
- Eliminate 90 percent of all large property losses through improvements in building design;
- Reduce fire injuries and fatalities at the accident site by 80 percent through safe fabrics, design of products, detection devices, and on-the-scene care;
- Increase the fire control capability of fire departments by 50 percent by faster response and more effective extinguishing methods.

These are long-term goals which, in the absence of major breakthroughs or absence of implementation, might never be attained. But they are guideposts for action. It is relevant to note that if the United States had undertaken its space program with the idea "We might get to the moon" instead of "We *will* land men on the moon," that event would probably still lie far in the future.

The Federal Role in Research

With annual allocations of about $27 million, the Federal Government accounts for one-fourth of the Nation's expenditures on research related to fire. There are kinds of research it would be inappropriate for the Federal Government to undertake. The development of specific products should remain in the private sector, as should fire endurance testing of materials and products.

It is appropriate for the Federal Government to undertake research that could lead to new products in the long run, especially when industry can only afford modest research for gradual refinement of its products. Studies on incentives and harriers to innovation, now under way in the National Science Foundation and the National Bureau of Standards, may lead to strategies of government-industry cooperation that could shift to industry a greater share of the research toward long-term improvements. How to encourage innovation among the manufacturers of firefighting and related equipment would be one of the major concerns of the proposed 'United States Fire Administration.

Many areas of research will continue to lie beyond the interest of profit-seeking organizations and, hence, more likely sponsored by nonprofit foundations, universities, or the Federal Government. This includes exploratory research into highly unconventional solutions for which the risks of arriving at a dead end are too great for industry to undertake. It includes basic medical research several steps removed from any new pharmaceutical or other therapeutic development. It includes research to serve the Government's own nonprofit ends, such as the pilot studies that should accompany the development of new programs in fire safety education.

The Federal Government has developed strong programs in basic and highly exploratory research concerning fire, notably in the National Bureau of Standards, the National Science Foundation, and the National Institutes of Health. Their programs fill important voids left by research in the private sector. Desirable as it might be from the standpoint of economizing, it is not likely that the private sector could fill the gaps if the programs were diminished in any way. **The Commission recommends that the Federal Government retain and strengthen its programs of fire research for which no nongovernmental alternatives exist.** This is not to say that all federally sponsored research should be done "in-house." Throughout the academic and technological communities there are excellent research resources, and the turning away of research from defense and aerospace programs provides a great source of expertise to be tapped.

There ought to be a clear set of priorities in federally sponsored research. Presently there is no group in the Federal Government looking at the total picture of fire research needs-including the physics and chemistry of fire, as well as medical, behavioral, and technological problems-and advising the budgetmakers on what programs deserve what level of support. This is an important function which the proposed U.S. Fire Administration would perform. As it is now, every agency's research program is, in effect, competing for dollars with every other fire research program.

Details of how the U.S. Fire Administration would carry out this function are discussed in the next chapter. Certain important aspects deserve mention here. First, the U.S. Fire Administration would have a system of data-collecting which would serve to guide research priorities. The de-

tailed information it gathered on firefighter injuries, for example, would indicate which injuries happen most often and deserve the most attention, as it would also indicate what must be changed to reduce those injuries.

Second, the U.S. Fire Administration would be an important clearinghouse of information, for both the public and private sectors. Thus it would know what research industry was pursuing, and it would also know what research problems are not being pursued and possibly deserve Federal attention. It would have the important function of disseminating research information to fire researchers everywhere, so that investigators could benefit quickly from the accomplishments of their colleagues and avoid duplicating each other's work. In these ways would the entire Nation's efforts in fire research be strengthened.

In the next chapter we also discuss the allocation of Federal resources for various purposes, including research. That analysis calls for a near-doubling of the Federal research effort; specifically, **the Commission recommends that the Federal budget for research connected with fire be increased by $26 million.** Our recommendation is based not solely on what federally sponsored research could accomplish in the reduction of fire losses, but also on the importance of research relative to other kinds of efforts to reduce losses.

Not a Federal Responsibility Alone

As important as Federal research is for combating the Nation's fire problems, the responsibility is not solely the Government's

Social and legal responsibilities are borne by the private sector as well. For example, car manufacturers are held responsible for defects in design or assembly that can lead to accidents. They are not held accountable, of course, for the stupid or careless actions of drivers. By the same token, the manufacturers of materials that go into the built environment are not responsible for the careless actions that lead to fire accidents. But what happens to those materials as a fire progresses can make the difference between a small loss and a huge one, indeed between life and death. To that extent do manufacturers share in the obligation to make the built environment fire-safe.

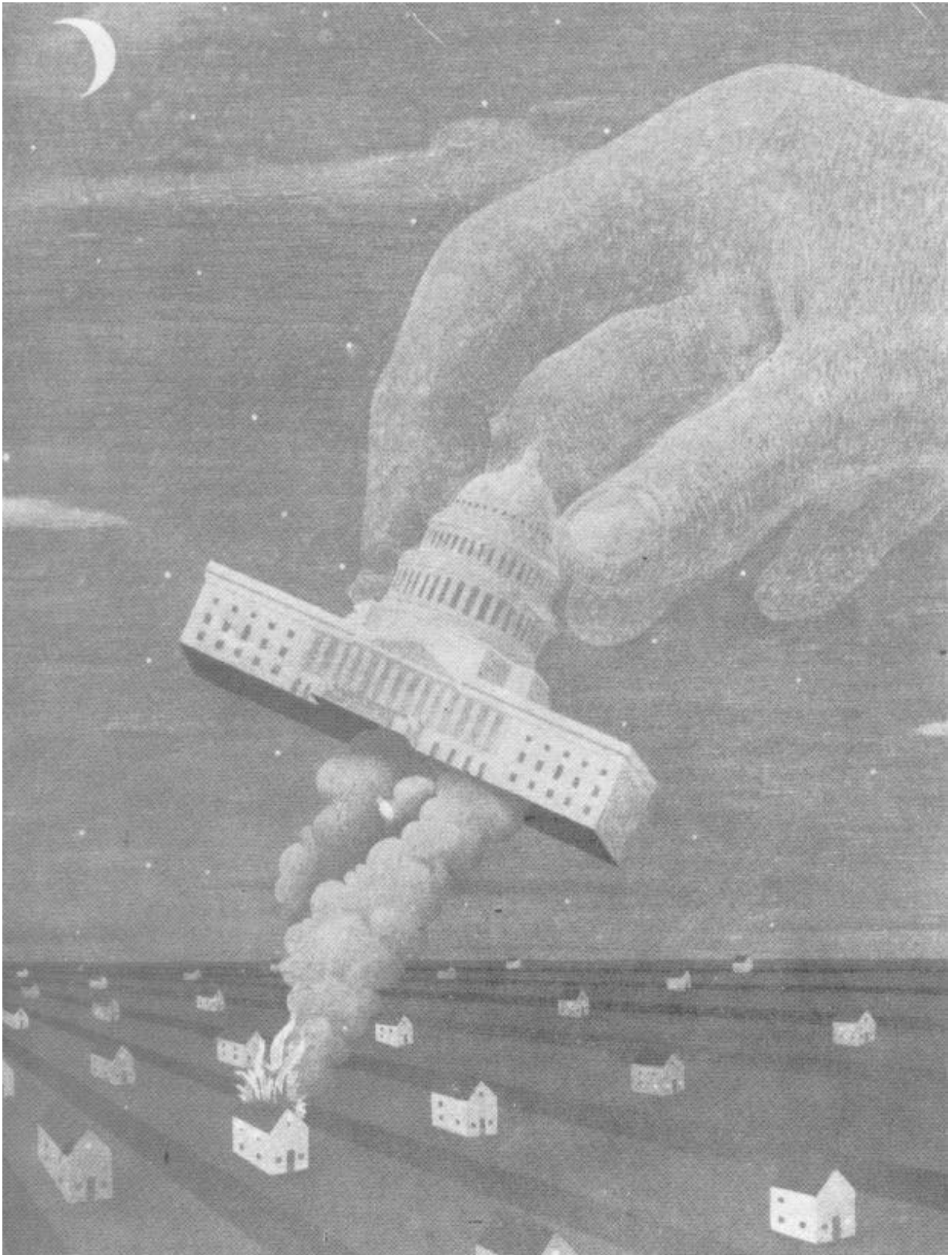
The Government can require that manufacturers make materials fire-safe, as it has done with certain fabrics and as we have recommended that the Consumer Product Safety Commission do for a whole range of materials and products. But industry should accept its responsibilities in the absence of coercion. Accordingly, **the Commission recommends that associations of material and product manufacturers encourage their member companies to sponsor research directed toward improving the fire safety of the built environment.**

People tend to think of research as an expendable luxury, an activity that can be cut off when today's problems, rather than tomorrow's, cry out for solution and total consumption of monetary resources. Behind this view there sometimes lies resentment that, in supporting research, society pays well-educated men and women to do what they enjoy doing, purely for their own satisfaction.

The view is extremely shortsighted. Many of today's problems could be quickly solved-or averted altogether-if yesterday there had been an adequate investment in research. For many years there was an under-investment in research to develop pollution-free automobile engines, and now the Nation is forced to a headlong rush, expensive and laden with problems, to develop those engines in time to meet Federal deadlines.

Likewise, problems for tomorrow can be staved off through adequate investments in research today. There is hope of arresting the so-called energy crisis through research on alternative, untapped sources of energy.

Through progress in medicine, automobile design, and pollution control, Americans are fighting against their destroyers. Some day they will awaken to the realization that they need not accept destructive fire passively. Research must go forward now so that, when that day arrives, effective countermeasures against fire will be ready. Indeed, there are already many Americans who do not accept destructive fire passively. They would have welcomed tomorrow's research accomplishments many years ago.



19
FEDERAL INVOLVEMENT

Time and again this report has made evident the need for Federal initiatives to help combat the Nation's fire problem, and also for coordination to strengthen programs now scattered among Federal agencies. These considerations point to an overriding need : *a permanent Federal agency specifically concerned with fire.*

Emphatically, what is not needed is a Federal bureaucracy assuming responsibilities that should be retained by State and local jurisdictions. Fire prevention, fire suppression, and public education on fire safety should remain primarily responsibilities of local governments, where familiarity exists with local conditions and the people being served. Communities have already invested heavily in manpower and equipment for fire protection, in recognition that it is a local responsibility. Likewise, regulatory responsibilities for fire prevention and code enforcement should remain at State and local levels. Codes and regulations must respond to changes in the built environment, and past experience illustrates that State and local governments are likely to be more dynamic and responsive to changing needs for different jurisdictions than a single Federal regulatory agency.

The Federal Government can help, however, in being a national advocate of fire protection and in providing better training and financial assistance-so that State and local governments and private enterprise can more effectively reduce deaths, injuries, and property losses from fire. Paramount among the objectives is to assist local fire services to improve their effectiveness and broaden their responsibilities from primarily fire suppression to a "fire loss management" orientation designed to prevent fires from happening and reducing their consequences when they occur.

The United States Fire Administration, as we have proposed to call the Federal instrumentality, would have other important functions as well:

- To evaluate the Nation's fire problem, through data collection and analysis, research, and conferences, and to keep the public and all branches and levels of government informed on current matters concerning destructive fire;
- To analyze and report on programs related to fire in other Federal agencies and recommend changes that would strengthen the Federal effort;
- Through the creation of a National Fire Academy, to provide improved training and education for fire service personnel, building designers, code officials, and others;
- To strengthen public awareness of fire's threat;
- To provide bloc grants to State government units for disbursement to local governments.

(These grants should not be overburdened with Federal criteria but contain simple guidelines for each State fire agency to administer.)

Parallels to the intergovernmental relations envisioned for the U.S. Fire Administration exist in the field of criminal justice. The Law Enforcement Assistance Administration awards grants for the strengthening of local law enforcement. LEAA gathers crime data, keeps criminal records and statistics for use by local law enforcement agencies, lends advice to those agencies, and, through the Law Enforcement Education Program, trains local law enforcement officers. Counterparts are needed in the field of fire protection.

Having given considerable thought to the objectives of the U.S. Fire Administration, the Commission has concluded that the Administration would best be placed in a Federal department that has a primary responsibility for urban affairs, urban planning, local government assistance, and housing, as well as knowledge of building requirements. Hence, **the Commission recommends that the proposed U.S. Fire Administration be located in the Department of Housing and Urban Development.** Under the President's Departmental Reorganization Program, the proposed successor to HUD, which would be known as the Department of Community Development, would also retain the urban affairs responsibilities.

Attachment to a Cabinet-level department is preferable to an independent commission. There is considerable feeling in the Executive branch that the growth of independent commissions ought to be arrested and reversed. Moreover, independent commissions, as a rule, have a history of early attention to their needs and later consolidation into departments to achieve support from the Executive branch. With a Cabinet-level spokesman for its programs, the U.S. Fire Administration would, over future years, have a better chance of continuing support.

At the same time, the U.S. Fire Administration would suffer inattention if buried many organizational levels down in its sponsoring department. The Fire Technology Division of the Institute for Applied Technology under the National Bureau of Standards within the Department of Commerce is an example of good intentions and inadequate support. [1]

TO provide effective advocacy of fire prevention and control, and firm executive control, responsibility, and accountability, the U.S. Fire Administration ought to be an Administrator-headed agency. Figure 1991 proposes an organizational scheme for the agency. Functions to be provided, as discussed in previous chapters :

Planning and Evaluation. To provide effective management, the organization must have a regular process for evaluating the success of its programs. It is from these evaluations that future priorities in the allocation of resources are derived.

General Counsel and Administrative Process. General Counsel provides the legal counsel for the agency, while Administrative Process handles the budget, accounting, and personnel, as well as the technical review of local and State assistance programs.

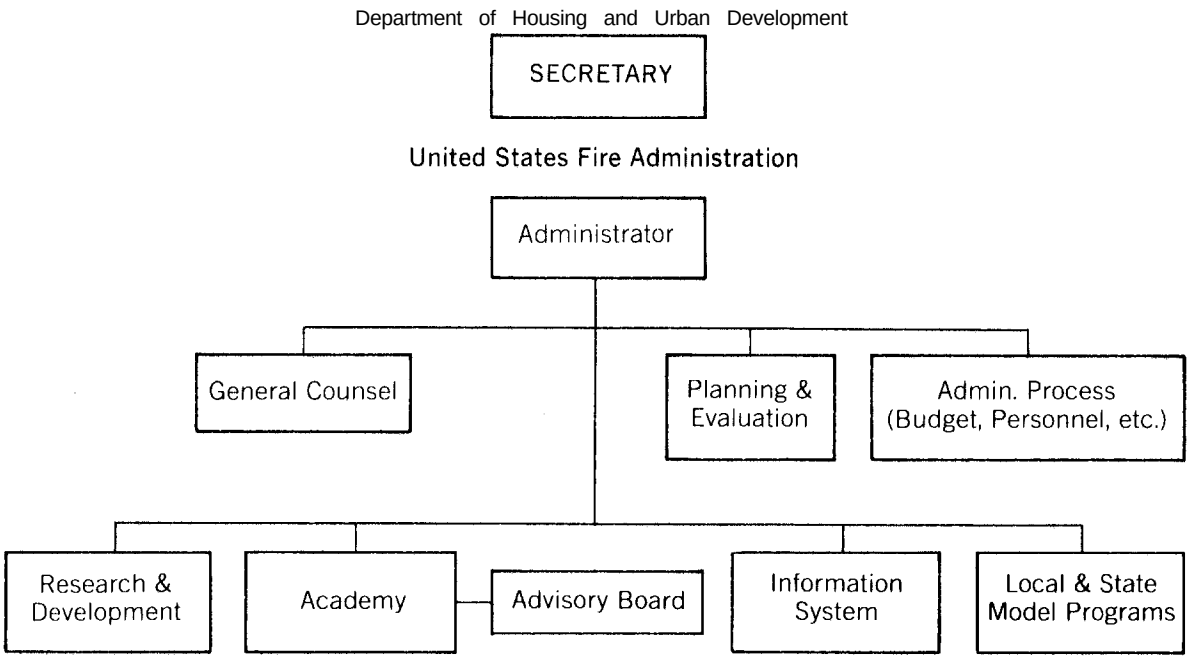
National Fire Academy. The Academy, discussed in Chapter 6, has an important function as a conduit of Federal assistance to local communities. Its educational programs could have a pronounced effect on fire prevention, fire safety in buildings, and the performance of local fire departments. All segments of the field of fire protection, both public and private, will benefit from the Academy, and all should have a part in its development.

Research and Development. This division sponsors and encourages research in the behavioral, physical sciences, and engineering areas, which have the greatest potential for reducing future fire losses. It works in cooperation with the technically oriented research programs at the National Bureau of Standards and the National Science Foundation, and with private groups. By also ensuring the flow of information among investigators in fire research, in both government and private laboratories, the division can hasten progress in research and discourage waste and duplication. A close interface with local, State, and Federal programs, the Academy, and information functions is essential.

Information System. Before effective management of a fire loss reduction program can be accomplished, good information is vital. Local and State feedback is essential to program evaluation. The fire data base for the Nation's fire

[1] See Minority Report of Commissioner Phillips.

Figure 19-1. Proposed Organization of the U.S. Fire Administration



services and the Federal and State governments should reside in the U.S. Fire Administration. This function will provide for a nationwide exchange of information pertaining to fire and life safety and have data collection, storage, retrieval, and dissemination capability. A uniform reporting system should be required for all' fire jurisdictions and would provide the first comprehensive fire data base in the Nation. **The Commission recommends that Federal assistance in support of State and local fire service programs bc limited to those jurisdictions complying with the National Fire Data System reporting requirements.** The development of this program could be contracted to a private organization skilled in information systems. The National Bureau of Standards will continue to have a role in data collection to support its research and engineering-based technology.

Local and State Model Programs. This division will have the primary responsibility for acting as liaison with local and State model programs developed through the Academy or the research division. Programs that provide assistance to school fire prevention education, community college fire science, fire service master plan programs, and public media education would fall into this division. Federal assistance is envisioned here in the form of education, information, and program grants. Assistance to public fire education, local master plan development, and statewide information systems are examples. A bloc grant system administered by each State fire agent is anticipated. A State fire agency may be a State fire commission or the office of the State fire marshal.

Present Federal Roles

The Federal Government is concerned with destructive fire in numerous ways. Research and development activities are scattered among many different agencies: fire suppression (mostly to protect Federal property), laws affecting the sale and shipment of hazardous materials, and testing flammability of materials for the purpose of setting standards are examples of Federal involvement.

Fire prevention and control. Fire prevention is oriented toward protecting Federal buildings and installations. In addition, the Forest Service of the U.S. Department of Agriculture maintains fire control capabilities to protect the Nation's forests and sponsors educational efforts to reduce forest fires. The Department of Defense is concerned not only with the, protection of military equipment and bases, but with the use and

control of fire in warfare. The fire activities within some departments are complex and not always easily identified. For example, the National Aeronautics and Space Administration does not have a fire program per se, but undertakes work related to fire problems as part of mission projects at a number of different research centers.

The Federal Fire Council was originally established as an interagency advisory group on matters relating to fire safety. It formed a medium for pooling talent from agencies for mutual aid in solving fire problems unique to the Federal Government, In reality, it has operated at a marginal level for several years. The U.S. Fire Administration will assume this responsibility and perform this important function for the agencies.

Research. In the realm of fire research, the Federal Government is a dominant force. In Chapter 18, we estimated that the fire-oriented research, development, testing, and evaluation activities in the Federal Government for fiscal year 1972 amounted to nearly $27 million. Most of the research is oriented to hardware solutions; there is comparatively little work on such behavioral questions as why people ignore fire safety, why they start tires, or how hardware systems could be used more efficiently.

Both the National Bureau of Standards and the National Science Foundation (under its Research Applied to National Needs program) have small but significant fundamental research programs in combustion and on test methods. The Forest Service has a major research program in forest fire prevention and control.

Data and Information. Fire information relating to burns and deaths is collected by the Center for Vital Statistics in the Department of Health, Education, and Welfare, and by the Forest Service relating to fire experience in forests and wildlands. The Occupational Safety and Health Administration collects information on work-related fire injuries. The Consumer Product Safety Commission collects information and conducts investigations on fire accidents involving products and flammable fabrics. Lastly, the National Bureau of Standards analyzes data relating to flammable fabrics and also operates a partly automated Fire Information Reference Service for use within the Federal Government. Additionally, NBS is developing a conceptual design for a Fire Loss Data System.

Federal efforts in this area have, however, been fragmentary-each division collecting only that information it has use for. No national, uniform, comprehensive data collection and analysis system exists.

Advisory Panels. Generally, each agency with an extensive research and development program (of which fire research may be a part) has advisory panels composed of experts from outside the Government. They advise on the nature and direction of the agency's programs. There also exists the National Research Council's Committee on Fire Research, which is specifically concerned with promoting and coordinating fire research.

The U.S. Fire Administration and Existing Programs

The Commission does not propose that all Federal fire roles transfer to the US. Fire Administration. Certainly the U.S. Forest Service has conducted an excellent fire program and should continue to do so. The Department of Health, Education, and Welfare has an excellent medical research and public education capability; this should be supported and augmented. The research and engineering-based technology programs presently underway at the National Bureau of Standards should continue to provide the base needed for improved fire safety. The research program of the National Science Foundation is making a significant contribution to needed fundamental scientific knowledge, and should continue. The Department of Housing and Urban Development should continue to encourage fire safety through the standards it has developed for its housing programs. The proposed U.S. Fire Administration would complement and help coordinate these many activities; it would provide the comprehensive evaluation and guidance necessary to determine areas of greatest need and then mobilize efforts in that direction; it would act as the central point in a program of information exchange that would strengthen all the Federal programs having to do with fire. And it would fill the voids, providing Federal help where it does not presently exist-such as providing assistance to local fire services. The recommended responsibilities of Federal agencies, and of the private sector, are shown in Table 19-1, on pages 144 and 145.

Implementing the U.S. Fire Administration

New legislation will be required to create the U.S. Fire Administration. Federal involvement will have to be phased, initially attacking the high priority problems where there is agreement on solutions. Establishment of the Administration will be a giant first step in the right direction.

The programs of the U.S. Fire Administration will also be subject to evolution and changing priorities. It is important, and should be a matter of continuing policy, that vitally affected groups, both in and out of government, participate in the planning of the agency's programs; that includes fire service organizations, the insurance industry, fire equipment manufacturers, codes and standards organizations, and especially the National Fire Protection Association. For the agency as a whole, this participation can be informal; but for the National Fire Academy, a formal advisory board should be established.

The projected costs in Table 19-2 can serve as an indication of minimum operating program needs and as a starting point for discussion.

Some of the amounts in the table should be thought of as "seed" monies-that is, funds to aid and encourage State and local governments to improve their programs and to sponsor research and information exchange. The funds in the Federal portion are also intended to overcome present barriers to innovation by creating the climate that provides the incentives to private enterprise to turn their attention to neglected needs in fire protection, For example, paid fire departments typically spend less than 1 percent of their budgets on capital and equipment investments. By encouraging them to spend 2 percent, the proposed program should enlarge the market for new equipment to the point where industry can afford major investments in improving firefighting equipment.

The most important aim of the proposed expenditures is to reduce the Nation's tragic losses from fire. The Commission believes that a reduction of 5 percent a year in deaths, injuries, and property losses is an attainable goal. That rate of reduction cannot be sustained indefinitely, and might be expected to level off as losses approach half of what they are today, It would take about 14 years to reach that plateau, (Bear in mind that the goal is a 5 percent reduction from the totals of the year preceding, which is a slower attrition than 5 percent this year, 10 percent next year, 15 percent the year thereafter.) In the first year, about 600 lives would be saved; at the end of 5 years, a cumulative total of 8,300 lives would be saved; at the end of 10 years, a total of 28,000 lives would be saved. During that lo-year period, 119,000 Americans would be spared the trauma of serious burn injury. Of importance from the standpoint of cost-effectiveness is that fact that a 5 percent reduction in dollar losses due to property destruction, personal earnings losses, and burn treatment costs would be $350 million the first *year-which is considerably more than we have projected for the annual costs of a Federal program for each of its first 5 full years.*

Table 19-2. Annual Program Operating Budgets

U.S. Fire Administration	$124,840,000
Local fire master plan development	30,000,000[1]
State and local training assistance	30,000,000[1]
Research	26,000,000[2]
Equipment upgrading assistance	15,000,000[1]
Public education	9,600,000
Firefighter personal protective equipment	4,000,000[1]
National fire data system	3,740,000[1]
National Fire Academy	4,000,000
Administration	2,500,000
Other programs	28,250,000
Burn treatment center, unit and program development (HEW)	5,000,000
National Institutes of Health program (burn and smoke research) (HEW)	3,250,000
Rural fire protection (USDA, Title IV of Public Law 92-419)	7,000,000[3]
Detection and alarm systems and built-in protection loan insurance (HUD)	10,000,000
Research and engineering-based technology program (NBS)	3,000,000
Total	$153,090,000[4]

[1] These Federal programs require State and local governments to provide matching participation.

[2] The $26 million does not include the current fire research budgets of Federal agencies. Funds shown here would be used to contract with public and private agencies where appropriate.

[3] This was the recommended annual funding level for a 3-year conservative rural fire protection program. Funds have not, as yet, been appropriated and the Commission feels that funding is more than justified by the losses in the areas covered.

[4] This budget is an estimate of the average annual expenditure for the first 5 years. The mix of expenditures will vary as staffs are recruited and trained.

Table 19-1 • Major Federal and Private Responsibility by Proposed U.S. Fire Administration Divisions

Agency	Academy	Information systems
Department of Housing and Urban Development, (Department of Community Development) Establish U.S. Fire Administration	Establish Academy Academy functions: (1) Fire service leadership education and training (2) Develop curricula and model programs for: • training fire service instructors • training fire management • fire suppression • fire prevention • master plan program • information systems • entrance and promotional examinations • paramedics and emergency medical services • arson investigation • fire safety design for engineers and architects • standardize firefighting termi- (3) Advocate for fire services	Develop National Fire Data System • tied in with State and local systems. develop uniform systems of reporting • research information collection • investigatory responsibilities for information gathering • disseminate information • publish report to President and Congress yearly on fire prevention and control status • review all Federal or federally sponsored fire programs annually and report to OMB • public education
Department of Commerce (Department of Economic Affairs)	Act as technical support arm for the Academy	Research and engineering based technology fire information system Report status of programs and fire budgets to USFA Investigatory responsibilities to gather information to support program
Department of Health, Education, and Welfare (Department of Human Resources)	Coordinate fire prevention programs with Academy	Burn and smoke injury and death information system Report status of programs and fire budgets to USFA Fire facts
Department of Agriculture (Department of Natural Resources)	Coordinate rural and wildlands fire training with Academy	Report status of programs and fire budgets to USFA
General Services Administration	Participate with Academy	Federal building fire experience information Report findings of merit to USFA
PRIVATE	Participate with Academy	Contract for development and implementation of information system; commercially distribute information (NFPA)
National Science Foundation (RANN)	Participate with Academy	
National Academy of Sciences	Participate with Academy	
Department of Defense	Act as disaster research arm for Academy	
Consumer Product Safety Commission	Participate with Academy	National Electronic Injury Surveillance System
Department of Transportation	Participate with Academy in fire protection and safety activities for all transportation modes	Provide transportation fire data

Local and State model programs	Research and development
Urban fire protection and education program Implement at State and local level: • information systems grants • state fire training grants • master plan for fire protection • local code enforcement programs • fire euipment grants • fire safety systems analysis and impact statements • home fire alarm systems • improved fire protection standards in focal and State codes • information systems (UFIRS)	Sponsor research in urban fire (1) Fire prevention and education: • fire caused by people (arson negligence) • effective fire prevention practices • public education (with HEW) (2) Fire services: • fire equipment • fire management • firefighter injuries • fire suppression. (3) fire safety design. Develop residential fire protection code for minimum property stand.
Assist State and local building and fire code groups in the development of standards	Conduct research and development • systems approach to fire safety • principles of fire detection and alarm systems • principles of fire retardants • fire behavior models • principles of built-in protection systems • new test methods • nature of basic flammability • fire equipment standards • building fire safety Evaluate and classify: • building materials • fire hazard properties Standardize: • fire research physical Science terminology
Sponsor special education for teachers Assist local fire departments and code enforcement agencies through notification of hazard Implement health department fire prevention programs at local levels Improve quality and availability of fire injury medical care	Sponsor research in: • burn and smoke treatment • public education for fire Safety (with USFA)
Rural fire protection and fire ed. ucation program • develop water systems, fi. nance fire equipment, fire prevention planning, advocate for the rural environment Forestand wildlands fire protection program	Conduct research in forest fire behavior and control weather forecast and early-warning systems
Implement Federal building fire safety design	Sponsor research in Federal building fire safety design
Model code groups implement improved fire protection standards	Sponsor and conduct research in all fire areas including: • Proprietary interests • Materials testing • Product development
.....	Sponsor research in fire technology application and basic fire research
.....	Serve as a review committee on fire needs
Model program for disaster pre. paredness	Research for disaster preparedness
.....	Flammable fabric and test method development
.....	Conduct research for transportation fire safety

20

WHAT CITIZENS CAN DO

It is an accepted principle of our society that government ought to intervene to protect citizens when voluntary safeguards are inadequate. As long as there are drivers who drink, there will be a need for government efforts to keep them off the highways. As long as there are unscrupulous merchants, there will be a need for laws and court procedures to protect consumers. As long as food processors use additives of unknown hazards to health, there will be a need for government to test these chemicals and ban them when appropriate.

And yet, two themes in American thinking about government run counter to acceptance of this principle. First, we as a people do not want government regulating every aspect of our lives. Second, we regard government regulation as a last resort, a morally inferior solution to voluntary safeguards. We would prefer, in other words, that in our society merchants and manufacturers *want* to protect the public rather than be required to do so. In brief, we want government that is not paternalistic and all-encompassing,

A balance must be struck. As President Nixon pointed out in his Second Inaugural, there is no "purely government solution for every problem" and individuals must be encouraged "to do more for themselves and decide more for themselves." Where the Government should act, he also pledged, it "will act boldly and lead boldly."

Consider the relevance of *public concern* to these observations. First, history has demonstrated over and over that the pressure of public concern lies behind voluntary self-regulation. The rating code of the movie industry is a convenient example. Second, government regulation has wide acceptability only when it is backed by considerable public concern. It is public concern that encourages voluntary regulation and legitimates government regulations.

This Commission harbors no illusions about the amount of public concern over the deaths, injuries, and property losses from the Nation's destructive fires. That concern is minuscule when compared with the magnitude of the problem. We hope, of course, that this report will serve to broaden and invigorate public concern over fire safety. The task to educate and sensitize Americans to the problems of fire safety, both by government and by private groups, must begin now.

To make a difference, public concern must be channeled toward specific objectives. Any number of this Commission's recommendations might serve as focal points for public pressure. At the

Federal level, for example, proposed new actions that could be hastened through "grassroots" sup port include :

- Extension of flammability standards or labeling requirements beyond rugs, mattresses, and children's sleepwear to other kinds of fabrics and to other classes of materials, such as those that go into home furnishings;
- Undertaking of a long-term, multiple-media, public service advertising campaign to make Americans more conscious of fire safety;
- Establishment of a United States Fire Administration to improve the fire services and of a National Fire Academy to upgrade their training, together with programs of financial assistance to local fire departments;
- Extension of the number of hospital facilities providing burn treatment and support of research to improve the treatment of burn and smoke inhalation injuries.

Citizens can also press for improvements at the State and local levels:

- Strengthening of the fire safety provisions of building codes;
- Shifting of fire department priorities toward fire prevention, with emphasis on inspection and educational programs;
- Encouragement of regional cooperative arrangements among fire departments;
- Providing adequate fire safety education in the schools and to preschool youngsters in nursery schools and day care centers.

Americans can take action to protect themselves from fire.

The Commission is confident that every concerned citizen who has access to pen and paper can find an appropriate avenue of expression, whether it is a letter to an editor or a letter to a public official elected to serve him. Arousing the interest of the press is important for two reasons: The press has the investigative tools to explore the adequacy of fire protection, particularly at the local level; it also has considerable power to mold public opinion.

Where Fire Safety Begins

In this report we have tried to make clear that fire is a potential threat to the life and well-being of every American, that while it has victimized the poor disproportionately no one is immune to harm from fire.

But prudence in daily living can minimize the chance of fire and make the difference between life and death if fire strikes. The minimal precautions in the home are well-established, if seldom observed: a well-maintained heating system, no overloaded electrical circuits, flammable liquids stored in tightly fitting containers and away from heaters and furnaces, absence of rubbish, unobstructed stairways, matches out of reach of children. Beyond these minimal precautions lie positive steps: the installation of fire extinguishers, fire escapes, or escape ladders, and-most important-early-warning detectors. Another measure, costing not a cent, is a family discussion-and rehearsal-of steps to be taken during various kinds of fire emergencies.

Prudence must be exercised outside the home as well. If there appear to be dangerous conditions at the place of work, these should be reported to the Occupational Safety and Health Administration. A conscious effort to note the location of fire exits when entering a building or a restaurant will likely become, in time, an ingrained habit.

Lastly, acquainting friends with the subject of fire safety may help to save a life or two some day.

America's Future

Twenty-five hundred years ago, the philosopher Heraclitus observed : "All things are exchanged for fire, and fire for all things-as wares are exchanged for gold and gold for wares."

Today we would put it differently: that heat energy is involved in the processes of creation and transformation, as it is involved as well in destruction and decay. Heat is both friend and foe. Lumber, petroleum and its distillates, electrical energy : Name any major source of destructive fire, and one realizes at once that we cannot get along without them. But we live in a tenuous relationship with them.

Through most of American history, resources were so abundant that we were blind to that tenuous relationship. What fire consumed could easily be replaced. Coincidentally, this Nation grew to maturity during a century and a half when death was accepted stoically. Whether by diphtheria, typhoid, or fire, death was entitled to its toll, even among young children. Advances in medical science changed American hopes and expectations, though fire never received the attention that went into the major diseases. As for material resources, only recently has the United States been converted to the view forced on other nations long ago: that resources are limited and need to be carefully managed.

During the years of America's development, one noble view has prevailed: that a citizen is entitled to any behavior that is not injurious to his neighbors. What has changed over the years is the concept of what is injurious behavior, and it has been broadened as a result of attention to ecological considerations. A dramatic example of how that concept has widened is the restrictions impaced on major fuel users during the winter of 1972-73. What might come to prevail, in future years, is the view that a fire caused by one American is a danger and an unfair cost to his fellow citizens.

It is appropriate to close with a reminder of an observation made earlier in this report. Many Americans, referencing the Second Amendment, vehemently defend their right to possess guns as protection against intruders. Happily, it has not been a task of this Commission to debate gun control. What is worthy of remark is that Americans have a duty, much more than a right, to protect themselves and others from fire.

495-792 O - 73 - 11